Chapter 13 Energy and Power

Study Guide

1. The Nature of Energy
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        ii. Calculating Kinetic Energy
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3. Energy Conversions and Fossil Fuels
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4. Power
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      i. Calculating Power
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   c. Horsepower

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SECTION 13-1 REVIEW AND REINFORCE

The Nature of Energy

◆ Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. How are work and energy related?

2. Compare and contrast kinetic energy and potential energy.

◆ Building Vocabulary

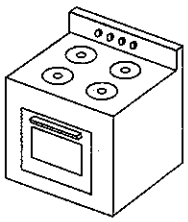
Match each illustration with the correct form(s) of energy by writing the letter or letters of the form(s) of energy on the line at the left of each illustration.

a. mechanical energy **b.** electrical energy

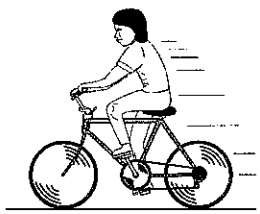
c. thermal energy **d.** nuclear energy

e. chemical energy **f.** electromagnetic energy

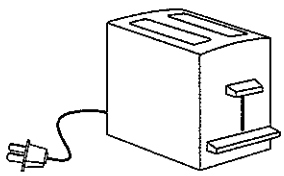
____ **3.**



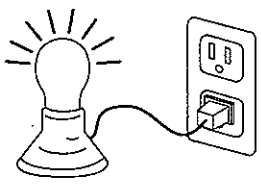
____ **4.**



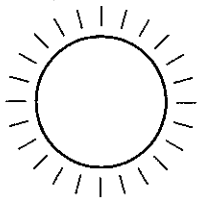
____ **5.**



____ **6.**



____ **7.**



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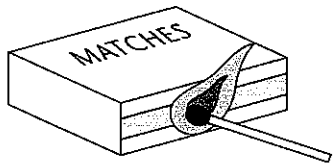

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

_____ **9.** energy

_____ **10.** elastic potential energy

_____ **11.** gravitational potential energy

a. the energy that depends on height

b. the ability to do work or cause change

c. the energy associated with objects that can be stretched or compressed

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SECTION 13-2 REVIEW AND REINFORCE

Energy Conversion and Conservation

◆ Understanding Main Ideas

Study the illustration above and then read the following statements. If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

_____ **1.** An energy conversion is occurring only at point 3.

_____ **2.** In this example, the law of conservation of energy says that the ball never loses kinetic energy.

_____ **3.** As the ball rises from point 1 to point 3, it slows down.

_____ **4.** The ball has the most potential energy at point 3.

_____ **5.** The ball has equal amounts of potential and kinetic energy at point 4.

◆ Building Vocabulary

Write a definition for each of the following terms in the spaces provided.

6. energy conversion

_____

_____

7. law of conservation of energy

_____

_____

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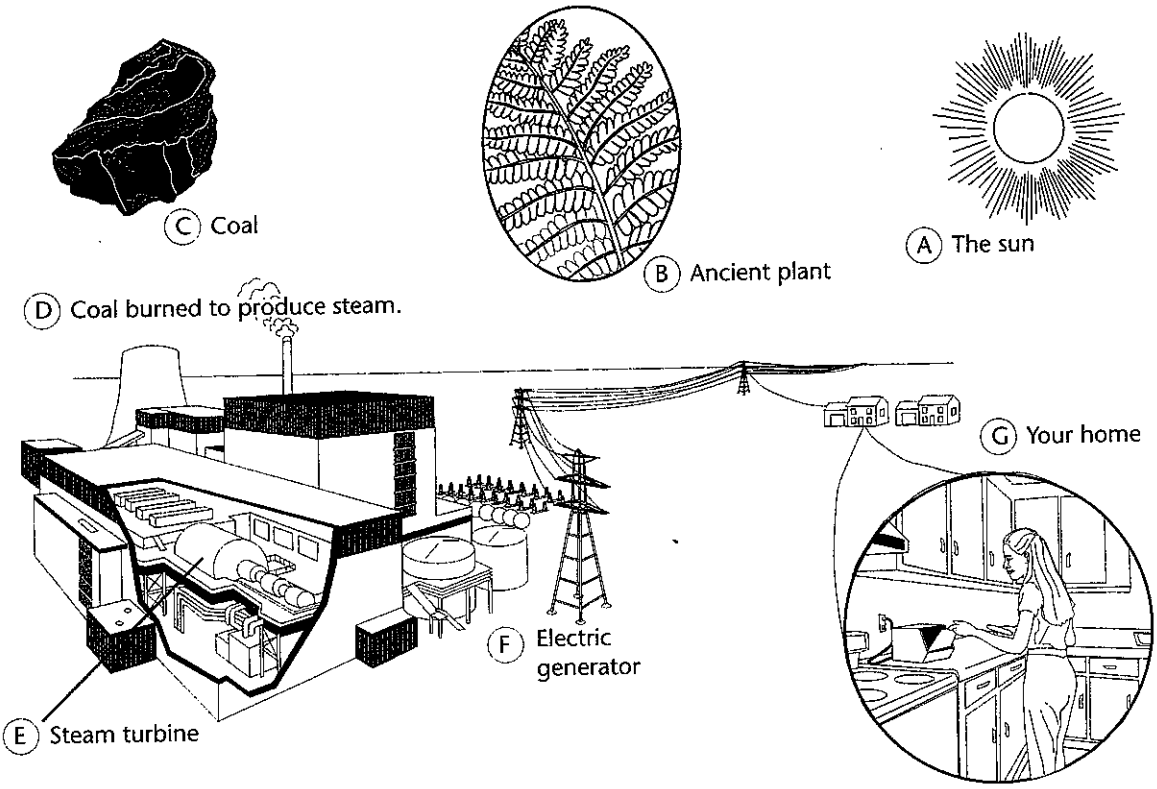
SECTION 13-3 **REVIEW AND REINFORCE**

Energy Conversions and Fossil Fuels

◆ Understanding Main Ideas



Study the illustration above, and then answer the questions on a separate piece of paper.

1. Explain what type of energy conversion takes place at point A.
2. What type of energy is converted into chemical energy by ancient plants and animals at point B?
3. The coal at point C is an example of what type of fuel? Give another example of this type of fuel.
4. How is the stored chemical energy converted into thermal energy at point D?
5. What type of energy does the steam in the power plant at point E have? What type of energy do the turbines have when they turn?
6. Explain what type of energy conversion takes place at the generators at point F.
7. Give an example of how electrical energy can be converted to another form of energy in your home.

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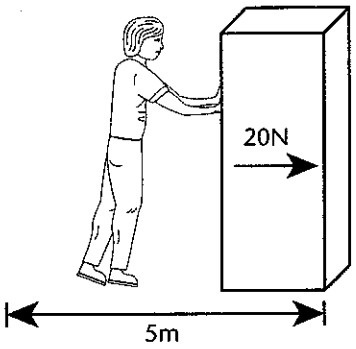
SECTION 13-4 REVIEW AND REINFORCE

Power

◆ Understanding Main Ideas



Study the illustration above, and then answer the following questions on a separate sheet of paper.

1. Ignacio is trying to move this crate. What are the two equations you can use to calculate the power Ignacio must use to move the crate?
2. If the crate does not move, does Ignacio perform any work? Does he use any power? Explain.
3. What else do you need to know to find the power Ignacio uses when he moves the crate?
4. Ignacio moves the crate in 10 s. How much power, in watts, does he use?
5. Carolina moves the crate in 5 s. How much power, in joules per second, does she use?
6. Felix moves the crate twice as far as Ignacio and Carolina in 5 s. How much power, in watts, does he use?

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Choose the letter of the correct answer.

1. The scientist who suggested that energy can be created under certain conditions was
   [A] Wright. [B] Pascal. [C] Einstein. [D] Newton.

2. Power equals work divided by
   [A] energy. [B] velocity. [C] time. [D] force.

3. The type of energy stored by fossil fuels such as coal is
   [A] mechanical energy. [B] chemical potential energy.
   [C] electromagnetic energy. [D] kinetic energy.

4. Moving water can be used to produce electricity because
   [A] kinetic energy can be converted into potential energy, but not vice versa.
   [B] energy cannot be converted into other forms of energy.
   [C] any form of energy can be converted into any other form.
   [D] potential energy can be converted into kinetic energy, but not vice versa.

5. Energy is measured in units called
   [A] joules. [B] horsepower. [C] meters. [D] pounds.

6. The process of burning a fuel is called
   [A] acceleration. [B] meltdown. [C] combustion. [D] conduction.

7. Kinetic energy increases as
   [A] both mass and velocity increase.
   [B] both mass and velocity decrease.
   [C] mass increases and velocity decreases.
   [D] mass decreases and velocity increases.

8. The energy associated with motion is called
   [A] elastic potential energy. [B] nuclear energy.
   [C] kinetic energy. [D] gravitational potential energy.

Choose the letter of the correct answer.

9. What type of energy does a spinning turbine have?
   [A] electrical energy [B] thermal energy [C] nuclear energy [D] mechanical energy

10. The ability to do work is called
    [A] conversion. [B] energy. [C] velocity. [D] friction.

11. Unlike kinetic energy, potential energy is
    [A] not measurable. [B] conserved. [C] energy of motion. [D] stored.

12. Energy stored in the core of an atom is called
    [A] electromagnetic energy. [B] nuclear energy.
    [C] chemical energy. [D] mechanical energy.

13. Which of the following has kinetic energy?
    [A] a car waiting at a red light [B] a rock poised for a fall
    [C] a rolling bowling ball [D] an archer's bow that is drawn back

14. The rate at which work is done is
    [A] power. [B] force. [C] energy. [D] velocity.

Fill in the word or phrase that best completes the statement(s).

15. An electric motor converts electrical energy to _____ energy.

16. The law of _____ states that energy cannot be created or destroyed.

17. If the speed of an object is doubled, its kinetic energy is multiplied by _____.

18. A device that is twice as powerful as another can do _____ the amount of work in the same amount of time.

19. Power is equal to _____ divided by time.

20. A truck and car are moving at the same speed. The truck has greater kinetic energy because its _____ is greater.

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

21. A light bulb converts <u>electrical</u> energy to electromagnetic energy.

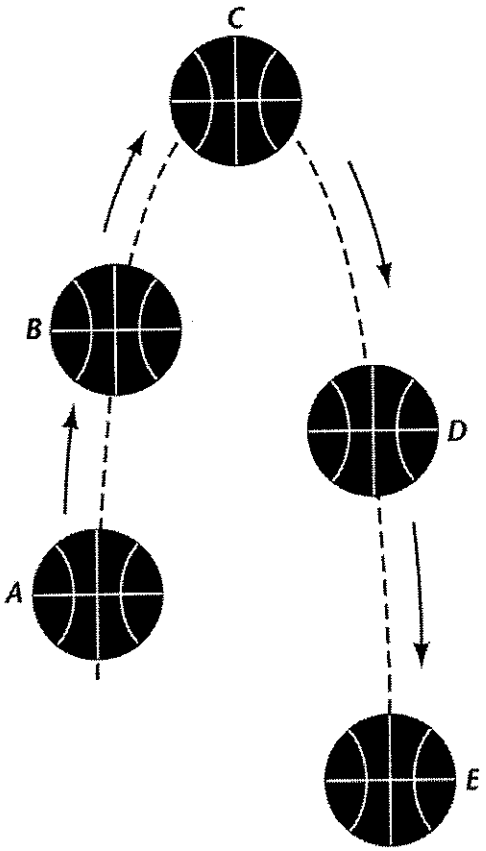
22. During combustion, a fuel's <u>electromagnetic</u> energy is converted to thermal energy.

23. An ice cube melts when its <u>mechanical</u> energy increases.

24. <u>Animals</u>, algae, and certain bacteria convert energy from sunlight into chemical energy through the process of photosynthesis.

Use the diagram to answer the question(s).

Potential and Kinetic Energy



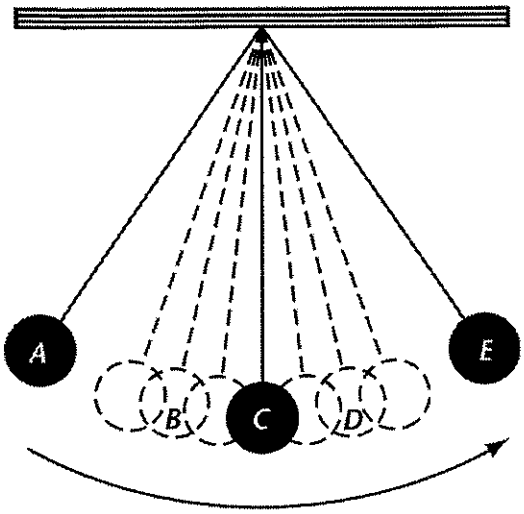
25. Which letter represents the position at which the basketball has the least potential energy? Explain.

26. Which letter represents the position at which the basketball has the least kinetic energy? Explain.

27. Compare the speed of the basketball at positions A and D. Explain your comparison.

Use the diagram to answer the question(s).

Energy of a Pendulum



28. Describe how the kinetic and potential energies of the pendulum are changing at position B.

Write an answer to the following question(s).

29. A generator supplies 15,000 J of electrical energy each minute. Determine the maximum number of 100-W light bulbs that the generator can power.

30. A 1-kg cart slams into a stationary 1-kg cart at 2 m/s. The carts stick together and move forward at a speed of 1 m/s. Determine whether kinetic energy was conserved in the collision. Use the law of conservation of energy to explain the collision.